

## Soyfoods help meet Mineral Requirements in Plant-Based Diets

### ENSA Scientific Advisory Committee Position Paper

#### Introduction

More and more of us are embracing plant-based eating. This trend is in line with official dietary guidelines recommending a shift towards plant-based eating because of the health and environmental benefits.

Removing animal foods from the diet and replacing these with more plant-based foods (either partly or completely) can improve our intake of certain nutrients. For example, potassium and fibre generally increase. However, depending on the degree of animal food restriction, intake of other nutrients, such as calcium, iron and zinc, may decrease. The European recommended amounts for these minerals are listed in Table 1.

**Table 1. European Dietary Recommendations for Selected Minerals.**

Gender	Iron (mg/d)	Zinc (mg/d)	Calcium (mg/d)
Male	11 <sup>1</sup>	16.3 <sup>1,2</sup>	1000 <sup>3</sup> 950 <sup>4</sup>
Female	16 <sup>5</sup> 11 <sup>6</sup>	12.7 <sup>1,2</sup>	1000 <sup>3</sup> 950 <sup>4</sup>

<sup>1</sup>≥18 years of age; <sup>2</sup>Based on phytate intake of 1200 mg/d; <sup>3</sup>18-24 years of age; <sup>4</sup>≥25 years of age; <sup>5</sup>Premenopausal women; <sup>6</sup>Postmenopausal women

As well as ensuring that sufficient quantities of these minerals are consumed in a plant-based diet, it's also important to consider how well they're absorbed by the body. This is because various dietary factors can either enhance or inhibit mineral absorption. Soya can play a valuable role in meeting mineral needs.



## Iron

There are two types of iron in food – heme and nonheme iron. All iron in plant foods is nonheme, whereas animal products contain a mixture of both. Nonheme iron is absorbed less efficiently than heme iron. For this reason, some health organizations recommend that vegetarians consume more iron than nonvegetarians.

Studies have found vegetarians are more likely to have lower iron stores than nonvegetarians despite vegetarian diets being slightly higher in iron. This has raised the question as to whether vegetarians are at higher risk of iron deficiency. Examining this issue in closer detail, it must be remembered several factors influence iron stores. For example, the amount of nonheme iron absorbed is influenced by the body’s need for iron – people with the lowest iron stores absorb more and excrete less. Also, the absorption of nonheme iron is determined by various dietary components that either enhance or inhibit its absorption. One such inhibitory factor is phytate, which is found in all whole grains and legumes, and thus, tends to be higher in vegetarian diets. In the past it was thought that phytate markedly reduced nonheme iron absorption and impaired iron status. However, there were shortfalls in the research that formed the basis for this conclusion. This research tended to consist of studies examining the effects of a single meal. It is now known that over time, in response to a high-phytate diet, the body overcomes the negative effects of phytate by increasing iron absorption.

Soya can help contribute to iron intake in a plant-based diet. As well as being a source of iron (Table 2), recent research has shown the iron found in soya is in the form of ferritin which is absorbed relatively well. It does not appear to be affected by the classic inhibitors of iron absorption (although it should be noted the ferritin content of soybeans may differ among different varieties).

**Table 2. Mineral and protein content of selected soyfoods per 100 g**

Soyfood	USDA database #	Iron (mg)	Zinc (mg)	Calcium (mg)	Protein (g)
Soybeans, boiled	16109	5.14	1.15	102	18.2
Edamame, frozen	11211	2.11	1.32	60	11.2
Tofu, prepared with calcium sulfate	16426	2.66	1.57	683	17.3
Soy drink, fortified	16223	0.49	0.24	140	2.9
Tempeh, cooked	16174	2.13	1.57	96	19.9

## Zinc

While some studies have found zinc intakes and blood zinc levels to be lower in vegetarians than non-vegetarians, other studies suggest there is not enough evidence to say this is the case for certain populations e.g. the elderly, children, pregnant and lactating women. According to new research, when zinc requirements increase, the body increases zinc absorption and retention to meet the body's increased requirements. For example, one study found that more zinc is absorbed by pregnant and lactating women, regardless of the amount of phytate in the diet. Just as iron absorption increases over time, it could be the same happens to zinc.

Nevertheless, official guidelines still recommend higher intakes of zinc according to the phytate content in the diet. As such vegetarians should be encouraged to eat more zinc than the general population. Soya can contribute to this (Table 2). Despite the presence of protein and phytates in soya, most studies find zinc absorption from soyfoods is only slightly lower than that from animal foods. Other good sources of zinc include fortified breakfast cereals and meat alternatives, sundried tomatoes, sunflower seeds, pumpkin seeds and tree nuts. Various food preparation methods, such as soaking and sprouting of beans, grains, nuts and seeds can also improve the absorption of zinc.

## Calcium

Calcium is an important mineral associated with bone health. One study examining the risk of fractures according to different dietary patterns, found there was a higher risk of fractures among vegans compared to meat eaters. However, this higher risk appeared to be due entirely to the low calcium intake of vegans. Among study participants who consumed more than 525mg of calcium a day, there was no difference in fracture risk among diet groups.

Dairy products are the main source of calcium in our diets and so when eliminating them it's important to consider suitable alternatives. Like iron and zinc, as well as intake, absorption needs to be addressed. In the case of calcium, absorption is mainly related to the oxalate content of foods. For example, the absorption of calcium from high-oxalate foods such as spinach and Swiss chard is very low. On the other hand, absorption from low-oxalate vegetables, such as kale, spring greens, broccoli, Pak choy and Chinese cabbage, is very good.

Although soya beans are high in phytate and oxalate, the absorption of calcium from soyfoods is comparable to dairy products.

Studies have found the calcium from calcium fortified soya drink and calcium set tofu is similar to the absorption of calcium from cow's milk. As shown in Table 2, the range of soyfoods available can make an important contribution to dietary calcium, particularly calcium fortified soydrink and calcium set tofu

In summary

Official public health advice recommends shifting towards a more plant-based diet.

Reducing animal food intake and increasing plant food consumption can improve the nutritional quality of the diet.

For those who eliminate all animal foods, special consideration needs to be given to certain minerals – calcium, iron and zinc.

As well as considering the quantity of these minerals in the diet, it's also important to consider how well they are absorbed.

Mineral requirements can be achieved in well-planned plant-based diets and soya foods make a valuable contribution to this mineral intake

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**About ENSA**

Established in January 2003, the ENSA represents the interests of natural soyfood manufacturers in Europe. The term “natural” refers to the production process used by ENSA members to produce food using whole soybeans. Soy food products from ENSA members are produced without any use of GM (genetically modified) material or GM beans.

ENSA is an association of internationally operating companies, ranging from large corporations to small, family-owned businesses with an annual turnover of €0.8 billion. Since its establishment in 2003, ENSA has been raising awareness about the role of soy and a plant-based diet in moving towards more sustainable food production and consumption patterns.

For more information about ENSA, please visit [www.ensa-eu.org](http://www.ensa-eu.org) or contact the Secretariat.

**ENSA Secretariat**

Rue du Luxembourg 22-24

Brussels 1000

Tel: +32 2 761 66 72

Email: [secretariat@ensa-eu.org](mailto:secretariat@ensa-eu.org)

Website: [www.ensa-eu.org](http://www.ensa-eu.org)